# ATSC Standard:
# Regional Service Availability

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**Advanced Television Systems Committee**
1300 I Street, N.W, Suite 400E
Washington, D.C. 20005
202-872-9160

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# ATSC Standard: Regional Service Availability

## 1. INTRODUCTION

### 1.1 Scope

This document specifies information describing the availability of broadcast services over time within a broadcast region. Broadcast receivers may use this information to help construct a list of services that may be available to them. Additionally, the information provides a schedule that allows receivers to maintain an up-to-date service list. This document describes how the information may be distributed using either an ATSC 1.0 broadcast (or any MPEG-2 transport stream), ATSC 3.0 broadcast or over broadband.

### 1.2 Background

Historically, broadcast frequencies and the standard for transmission over them have been relatively stable with limited changes over time. In the United States, recent regulatory activities have caused the reallocation of frequencies, forcing broadcasters to move from one frequency to another and to combine services on single frequencies. These changes are not happening simultaneously and will continue for some time into the future. These transitions are further complicated by the emergent ATSC 3.0 standards where some broadcasts will not only change to another frequency but will also change the standard used to broadcast on that new frequency.

The ATSC 3.0 standard is expected to continue to be updated over time and broadcasters may elect to stay with ATSC 1.0, transition to ATSC 3.0 and perhaps to some other future ATSC standard. Again, any of these changes may occur coincident with a frequency shift.

In summary, what had previously been a relatively static environment is now fluid and information regarding transitions both to new frequencies as well as to new standards will help broadcast receivers to better discover and maintain service lists.

## 2. REFERENCES

### 2.1 Normative References

[1] ATSC: "ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable," Doc. A65/2013, Advanced Television Systems Committee, Washington, DC, 7 August 2013.

[2] ATSC: "ATSC Standard: Signaling, Delivery, Synchronization, and Error Protection," Doc. A/331:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[3] IEEE: "Use of the International Systems of Units (SI): The Modern Metric System," Doc. SI 10, Institute of Electrical and Electronics Engineers, New York, NY.

[4] IETF: RFC 1952, "GZIP file format specification version 4.3," Internet Engineering Task Force, Reston, VA, May 1996. http://tools.ietf.org/html/rfc1952

[5] ISO/IEC: "Information Technology – Generic coding of moving pictures and associated audio – Part 1: Systems," Doc. ISO/IEC 13818-1:2015, International Organization for Standardization/International Electrotechnical Commission, Geneva Switzerland.

[6] ATSC: "ATSC Data Broadcast Standard," Doc. A90/2013, Advanced Television Systems Committee, Washington, DC, 28 October 2013.

[7] W3C: "XML Schema Part 2: Datatypes Second Edition" W3C Recommendation, Worldwide Web Consortium, 28 October 2004.
https://www.w3.org/TR/xmlschema-2/

[8] ATSC: "ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable," Doc. A65/2013, Advanced Television Systems Committee, Washington, DC, 7 August 2013.

### 2.2 Informative References

[9] IETF: RFC 6838 (BCP 13), "Media Type Specifications and Registration Procedures," Internet Engineering Task Force, Reston, VA, January 2013.
https://tools.ietf.org/html/rfc6838

[10] IETF: RFC 7303, "XML Media Types," Internet Engineering Task Force, Reston, VA, July 2014.
https://tools.ietf.org/html/rfc7303

[11] GPO: 47 CFR 73.603, "Numerical Designation of Television Channels," Government Publishing Office, October 2017.
https://www.govinfo.gov/content/pkg/CFR-2017-title47-vol4/pdf/CFR-2017-title47-vol4-sec73-603.pdf

## 3. DEFINITION OF TERMS

With respect to definition of terms, abbreviations, and units, the practice of the Institute of Electrical and Electronics Engineers (IEEE) as outlined in the Institute's published standards [3] shall be used. Where an abbreviation is not covered by IEEE practice or industry practice differs from IEEE practice, the abbreviation in question is described in Section 3.3 of this document.

### 3.1 Compliance Notation

This section defines compliance terms for use by this document:

**shall** – This word indicates specific provisions that are to be followed strictly (no deviation is permitted).

**shall not** – This phrase indicates specific provisions that are absolutely prohibited.

**should** – This word indicates that a certain course of action is preferred but not necessarily required.

**should not** – This phrase means a certain possibility or course of action is undesirable but not prohibited.

### 3.2 Treatment of Syntactic Elements

This document contains symbolic references to syntactic elements used in the audio, video, and transport coding subsystems. These references are typographically distinguished by the use of a different font (e.g., restricted), may contain the underscore character (e.g., sequence_end_code) and may consist of character strings that are not English words (e.g., dynrng).

#### 3.2.1 Reserved Elements

One or more reserved bits, symbols, fields, or ranges of values (i.e., elements) may be present in this document. These are used primarily to enable adding new values to a syntactical structure

without altering its syntax or causing a problem with backwards compatibility, but they also can be used for other reasons.

The ATSC default value for reserved bits is '1'. There is no default value for other reserved elements. Use of reserved elements except as defined in ATSC Standards or by an industry-standards-setting body is not permitted. See individual element semantics for mandatory settings and any additional use constraints. As currently reserved elements may be assigned values and meanings in future versions of this Standard, receiving devices built to this version are expected to ignore all values appearing in currently-reserved elements to avoid possible future failure to function as intended.

## 3.3 Acronyms and Abbreviations

The following acronyms and abbreviations are used within this document.

**EA** Emergency Alert
**ESG** Electronic Service Guide
**LLS** Low Level Signaling
**RSAT** Regional Service Availability Table
**SLS** Service Level Signaling
**SLT** Service List Table
**URL** Uniform Resource Locator
**XML** eXtensible Markup Language

## 3.4 Terms

**Region** – A geographic area where there is a possibility of reception of the broadcast signal.

**reserved** – Set aside for future use by a Standard.

**Service** – A time-linear collection of TV programming, typically identified and marketed by brand. Viewers generally consider two services to be the same if the services have the same content even though they may be accessed on different frequencies or with different major and minor numbers. It is expected that during the transition, the same Service will be broadcast over ATSC 1.0 and ATSC 3.0 simultaneously. The definition of Service herein is independent of encoding method and structure of the supporting essence streams.

**Service Reception Specification** – The actual values that define how to gain access to a Service in a broadcast environment. The Service Reception Specification consists of a major number, a minor number, the center frequency and the broadcast type: ATSC 1.0 or ATSC 3.0 (see Section 5.1). An RSAT provides a list of Service Reception Specifications and changes to those specifications.

## 3.5 Extensibility

The protocols specified in the present standard are designed with features and mechanisms to support extensibility. In general, the mechanisms include:

- Use of "protocol version" fields
- Definition of fields and values reserved for future use
- Use of XML, which is inherently extensible by means of future addition of new attributes and elements, potentially associated with different namespaces

Receiving devices are expected to disregard reserved values, and unrecognized or unsupported descriptors, XML attributes and elements.

### 3.6 XML Schema and Namespace

Several new XML elements are defined and used in this Standard. These elements provide various service signaling elements and attributes defined in this standard. These new XML elements are defined with separate namespaces in schema documents that accompany this standard. The namespaces used by various schemas are described in individual sections of the present document. The sub-string part of namespaces between the right-most two '/' delimiters indicate major and minor version of the schemas. The schemas defined in this present document shall have version '1.0', which indicates major version is 1 and minor version is 0.

The namespace designator, "`xs:` ", and many terms in the "Data Type" column of tables is a shorthand for datatypes defined in W3C XML Schema [7] and shall be as defined there.

In order to provide flexibility for future changes in the schema, decoders of XML documents with the namespaces defined in the present document should ignore any elements or attributes they do not recognize, instead of treating them as errors.

All element groups and attribute groups are explicitly extensible with elements and attributes, respectively. Elements can only be extended from namespaces other than the target namespace. Attributes can be extended from both the target namespace and other namespaces. If the XML schema does not permit this for some element, that is an error in the schema.

XML schemas shall use `processContents="strict"` in order to reduce inadvertent typos in instance documents.

XML instance documents shall use UTF-8 encoding.

In the event of any discrepancy between the XML schema definitions implied by the tables that appear in this document and those that appear in the XML schema definition files, those in the XML schema definition files are authoritative and take precedence.

The XML schema document for the schemas defined in this document can be found at the ATSC website.

## 4. OVERVIEW

Within the last 20 years, broadcast frequencies and the standard for transmission over them (ATSC 1.0) have been relatively stable with limited changes over time. With the advent of the reverse auction and subsequent frequency repack, broadcasters are now moving from one frequency to another and combining services on other frequencies. These transitions are further complicated by the emergent ATSC 3.0 standards that enable broadcasters to switch to a new transmission standard. Some broadcasts will not only change to another frequency but will also change the standard used to broadcast on that new frequency.

The ATSC 3.0 standard is expected to continue to be updated over time and broadcasters may elect to stay with ATSC 1.0, transition to ATSC 3.0 and perhaps to some other ATSC 3.0 derivative in the future. Again, this may occur coincident with a frequency shift.

Receiver implementations have had little incentive to optimize the discovery process of new services assuming the precedent lack of change in the broadcast environment once the receiver was installed. A lengthy channel scan process is considered acceptable since it is expected to be performed very infrequently. However, the assumption of a relatively static service map is no longer valid as pointed out above. Indeed, as new service offerings come and go to compete with many new alternative content delivery paths, receivers may need to detect new and obsolete services on a monthly and perhaps even daily basis.

Prior to the present standard, there was no defined mechanism receivers could rely on to anticipate that service offerings would change in the future. Providing this information in the broadcast allows receivers equipped to handle this data to automatically update service lists or inform the user that something is going to happen. In addition, as the new transmission standard is embraced, higher quality versions of the same content stream might be available. The inclusion of preferred service signaling allows the broadcaster to indicate that these services are available and, perhaps, preferred for some reason (e.g. higher resolution, better color, or improved audio).

The regional service availability table (RSAT) provides information that allows broadcasters to communicate some or all the information described above. It contains a schedule of when broadcasts and services will be available and when they will be obsolete. Furthermore, the table allows certain services to be marked as preferred.

## 5. REGIONAL SERVICE AVAILABILITY

The regional service availability information supplies a list of Service Reception Specifications and information about when and how those specifications will change. In addition, this information can specify preferred Service Reception Specifications that may provide better quality or some other attribute that consumers may find preferable.

For the purposes of the present document, a "Region" is a geographic area where there is a possibility of reception of the broadcast signal. There is no expectation that any given receiver can receive or will be able to receive the defined broadcast, only that there is a possibility given the expectation of transmission coverage.

The service availability information is provided to allow receivers to optimize their channel and service models and improve the maintenance of those models. The present document does not state expected receiver behavior though some examples of how receivers could respond to the availability data are provided for clarity.

### 5.1 Regional Service Availability Table (RSAT)

The Regional Service Availability Table (RSAT) shall be represented as an XML document containing an **RSAT** root element that conforms to the definitions in the XML schema that has namespace:

```
tag:atsc.org,2018:XMLSchemas/ATSC/Delivery/RSAT/1.0/
```

The definition of this schema is in an XML schema file, RSAT-1.0-2018mmdd.xsd accompanying this standard, as described in Section 3.6 above. The XML schema xmlns short name should be "RSAT".

While the XML schema identified above specifies the normative syntax of the elements specified in this ATSC 3.0 standard, the informative Table 5.1 below describes the structure of the **RSAT** element in a more illustrative way. In addition, while the XML schema referenced above is authoritative with respect to the XML *syntax*, the table and descriptions following the table have normative statements regarding the *semantics* of the XML schema. This is due to limitations in the XSD schema language.

**Table 5.1** Syntax of the RSAT

| Element Name | Cardinality | Data Type | Description |
|---|---|---|---|
| **RSAT** | 1 | | Includes Broadcast Availability collection elements. |
| @timestamp | 1 | dateTime | The Date and Time when this data structure was last updated. |
| @RSATInetURL | 0..1 | anyURI | Base URL pointing to a broadband version of the RSAT XML document as defined here. |
| **Service** | 0..N | | Contains Service attributes and updates. |
| @preferred | 0..1 | boolean | Indicates whether the service is preferred or not. |
| @majorChannelNo | 0..1 | unsignedShort 1..N | Major channel number of service. For ATSC 1.0, "N" is "99". For ATSC 3.0, "N" is "999". |
| @minorChannelNo | 0..1 | unsignedShort 1..N | Minor channel number of service. For ATSC 1.0, "N" is "99". For ATSC 3.0, "N" is "999". |
| @frequency | 0..1 | float | Center frequency of broadcast in MHz. |
| @broadcastType | 0..1 | token | The type of broadcast as defined in Table 5.2. |
| @validUntil | 0..1 | dateTime | Last date and time when service will be available. |
| **Update** | 0..N | | Defines Updates to the Service including new Services with the same content. |
| @preferred | 0..1 | boolean | Indicates whether the service is preferred or not. |
| @majorChannelNo | 0..1 | unsignedShort 1..N | Major channel number of service. For ATSC 1.0, "N" is "99". For ATSC 3.0, "N" is "999". |
| @minorChannelNo | 0..1 | unsignedShort 1..N | Minor channel number of service. For ATSC 1.0, "N" is "99". For ATSC 3.0, "N" is "999". |
| @frequency | 0..1 | float | Center frequency of broadcast in MHz. |
| @broadcastType | 0..1 | token | The type of broadcast as defined in Table 5.2. |
| @validFrom | 0..1 | dateTime | Date and time when this update will occur. |

**RSAT** – This root element shall contain either the @RSATInetURL attribute and/or at least one **Service** element. Note that constraints on when an **Update** element must appear within a **Service** element are described in the description of the **Update** element below.

@timestamp – Specifies the date and time in UTC when the RSAT data structure was last updated. This attribute shall be set to the current date and time whenever any other attribute or structure within the XML fragment is either added, removed, or modified.

@RSATInetURL – If provided, this element shall contain the URL allowing a receiver to acquire a version of the RSAT XML document as defined here over broadband. This allows, for example, only changes in the availability information to be sent over broadcast, and the complete set of the RSAT data to be delivered over broadband. This limits bandwidth consumed in the broadcast. The RSAT data available via broadband may contain all services defined by a broadcaster or broadcasting group for the entire region.

**Service** – Each instance of this element contains a Service Reception Specification for an existing service within the region and may define one or more new Service Reception Specifications that the receiver may be able to receive by including one or more **Update** elements. The attributes associated with this element allow the receiver to identify a specific service that is presently available in the region. If any attributes are supplied, then @majorChannnelNo, @minorChannnelNo, @frequency and @broadcastType shall all be present. These four

attributes provide a uniquely identifying tuple for the Service Reception Specification and cannot be underspecified in the `Service` element. The `@preferred` and `@validUntil` attributes shall not appear either separately or together without the `@majorChannnelNo`, `@minorChannnelNo`, `@frequency` and `@broadcastType` attributes also being present.

`@preferred` – A Boolean value indicating, if 'true', that the broadcaster suggests that the associated service be preferred over the same service being distributed in other formats. For example, this would typically be used for an ultra-high definition (UHD) service when a standard definition (SD) version of the service is available in the same region. This attribute defaults to 'false' if not present.

`@majorChannnelNo` – An integer number in the range 1 to 999, for ATSC 3.0, and 1 to 99 for ATSC 1.0, that shall represent the "major" channel number of the service. For ATSC 1.0, this number shall be consistent with the definition provided in A/65 Annex B [1] and for ATSC 3.0, further reiterated by A/331 [2].

`@minorChannnelNo` – An integer number in the range 1 to 999, for ATSC 3.0, and 1 to 99 for ATSC 1.0, that shall represent the "minor" channel number of the service. For ATSC 1.0, this number shall be consistent with the definition provided in A/65 Annex B [1] and for ATSC 3.0, further reiterated by A/331 [2].

`@frequency` – This is the center frequency of the channel, computed as half the sum of the lower edge and upper edge frequencies. Note: North American television information can be found at [11].

`@broadcastType` – Defines the broadcast type of the Service Reception Specification. See Table 5.2 below.

**Table 5.2** Definitions of Broadcast Types

| @broadcastType | Description |
|---|---|
| ATSC1.0 | ATSC 1.0 (A/53) 8-VSB Broadcast |
| ATSC3.0 | ATSC 3.0 (A/300) Broadcast |
| | All other values are ATSC Reserved |

`@validUntil` –When provided, this attribute shall indicate the date and time in UTC when the associated Service Reception Specification will no longer be available. If this attribute is not defined, the Service Reception Specification shall continue to be available indefinitely.

`Update` – The `Update` element provides a mechanism to describe a new Service Reception Specification. The element operates in two modes as described in the list below.

- **Update Mode** – Defines only the attributes that are changing from the parent Service resulting in a new Service Reception Definition. This mode shall only be available if at least the `@majorChannnelNo`, `@minorChannnelNo`, `@frequency` and `@broadcastType` attributes are specified in the parent `Service` element. Any attributes not present in the `Update` element shall assume the default values as specified in the parent `Service` element.
- **New Specification Mode** – Specifies a complete set of tuple attributes describing a completely new Service Reception Definition where the Service may be found. A minimum of `@majorChannnelNo`, `@minorChannnelNo`, `@frequency` and `@broadcastType` attributes shall be present.

If no attributes are defined for the containing `Service` element, then at least one `Update` instance shall be present defining at least the `@majorChannnelNo`, `@minorChannnelNo`, `@frequency` and `@broadcastType` attributes of a new Service Reception Specification.

The attribute definitions provided in the `Service` description above also apply to the attributes of the same name within the `Update` element.

`@validFrom` – When provided, this attribute shall indicate the date and time in UTC when the new Service Reception Specification takes effect.

## 5.2 Regional Service Availability Table (RSAT) Distribution

The Regional Service Availability information can be thought of as a database and the RSAT as a way of distributing the data from that database so that receivers may create and maintain a reasonable facsimile as the service database changes over time. The present standard makes no normative statements regarding how much of this notional database should be distributed, if any, and how the data should be partitioned into separate tables. In fact, the information could be distributed differently for each distribution method. For example, only ATSC 1.0 frequencies could be included in RSATs intended to be distributed with ATSC 1.0 transport streams. However, the entire database for a region could be made available over broadband as a public service.

In addition, there may be multiple instances of the RSAT delivered within a single transmission path. For example, it may be convenient for multiple broadcasters sharing a frequency to manage the various contributions to the transmission separately, supplying the RSAT only for the portions managed.

On receipt of an RSAT, receivers may automatically update their service lists or perform a channel scan to validate reception at the time of the scheduled change. Alternatively, receivers may inform the user that a channel or service change is imminent and ask for guidance as to how to proceed.

### 5.2.1 RSAT Download Service over MPEG-2 Transport

For transmission over an MPEG2 Transport Stream [5], the RSAT XML document is sent as a module using the DSM-CC DownloadDataBlock (DDB) message as defined in A/90, Section 7.2.4 [6].

Note: This "DDB-only" design does not conform to all provisions of the A/90 Data Download Protocol including the (lack of) emission of the DownloadServerInitiate and DownloadInfoIndication Sections.

The RSAT XML document shall be compressed using gzip [4].

The **dsmccDownloadDataHeader** fields shall be set according to A/90 Section 7.2.4.1 [6].

The DDB fields shall be set as follows:

**moduleID** – Zero (there is only one module).

**moduleVersion** – This field shall be incremented by one whenever the contents of the RSAT XML document changes.

**blockNumber** – Zero (there is only one block).

There shall be only one instance of an RSAT module transmitted. That is, different instances are not interleaved in a single transport stream.

The RSAT download service shall be signaled using a Program and System Information Protocol (PSIP) Virtual Channel with a service_type of 0x0A. A Virtual Channel with this service_type value shall have exactly one Program Element of stream_type 0x0B which shall contain the DDB. The DDB should be emitted at least once every 15 minutes.

Note: There is no announcement (schedule of future RSAT instance document emissions) defined for this service.

### 5.2.2 RSAT ATSC 3.0 Broadcast Distribution

For ATSC 3.0 broadcasts, the Regional Service Availability Table (RSAT) described in Section 5.1 shall be distributed using the Service Layer Signaling protocols described in Section 7.1.6 of A/331 [2]. The file content-type shall be "application/atsc-rsat+xml". Note that the versioning mechanisms provided as part of the EFDT and other signaling mechanisms shall also apply to the RSAT.

### 5.2.3 RSAT Broadband Distribution

An RSAT may be delivered via broadband using HTTP. When delivered via broadband, the RSAT shall be available by an HTTP Request, using a URL for this purpose which is signaled in the SLT for the service as defined in A/331, "Signaling, Delivery, Synchronization and Error Protection" [2].

The timing and location information for retrieving a scheduled update to an RSAT via broadband are provided by the `@validUntil` and `@nextURL` attributes, respectively, of the metadata envelope of the RSAT as defined in A/331, "Signaling, Delivery, Synchronization and Error Protection" [2].

# ***Annex A***: RSAT Processing Flowchart [Informative]

## A.1 INTRODUCTION

The following pages of this annex provide an example flowchart of the steps for a decoder to process a Regional Service Availability Table (RSAT). The intent is to clarify the relationships between elements and attributes defined in Section 5.1.

The three flowchart diagrams are interconnected as follows:

- **Figure A-1** RSAT Processing Flowchart – Sheet 1 – Service element processing.
- **Figure A-2** RSAT Processing Flowchart – Sheet 2 – Update Mode (see `Update` element definition), flowchart connector **A**.
- **Figure A-3** RSAT Processing Flowchart – Sheet 3 – New Specification Mode (see `Update` element definition), flowchart connector **B**.

The following abbreviations are used within the flowchart figures:

- major = `@majorChannelNo`
- minor = `@minorChannelNo`
- freq = `@frequency`
- until = `@validUntil`
- from = `@validFrom`

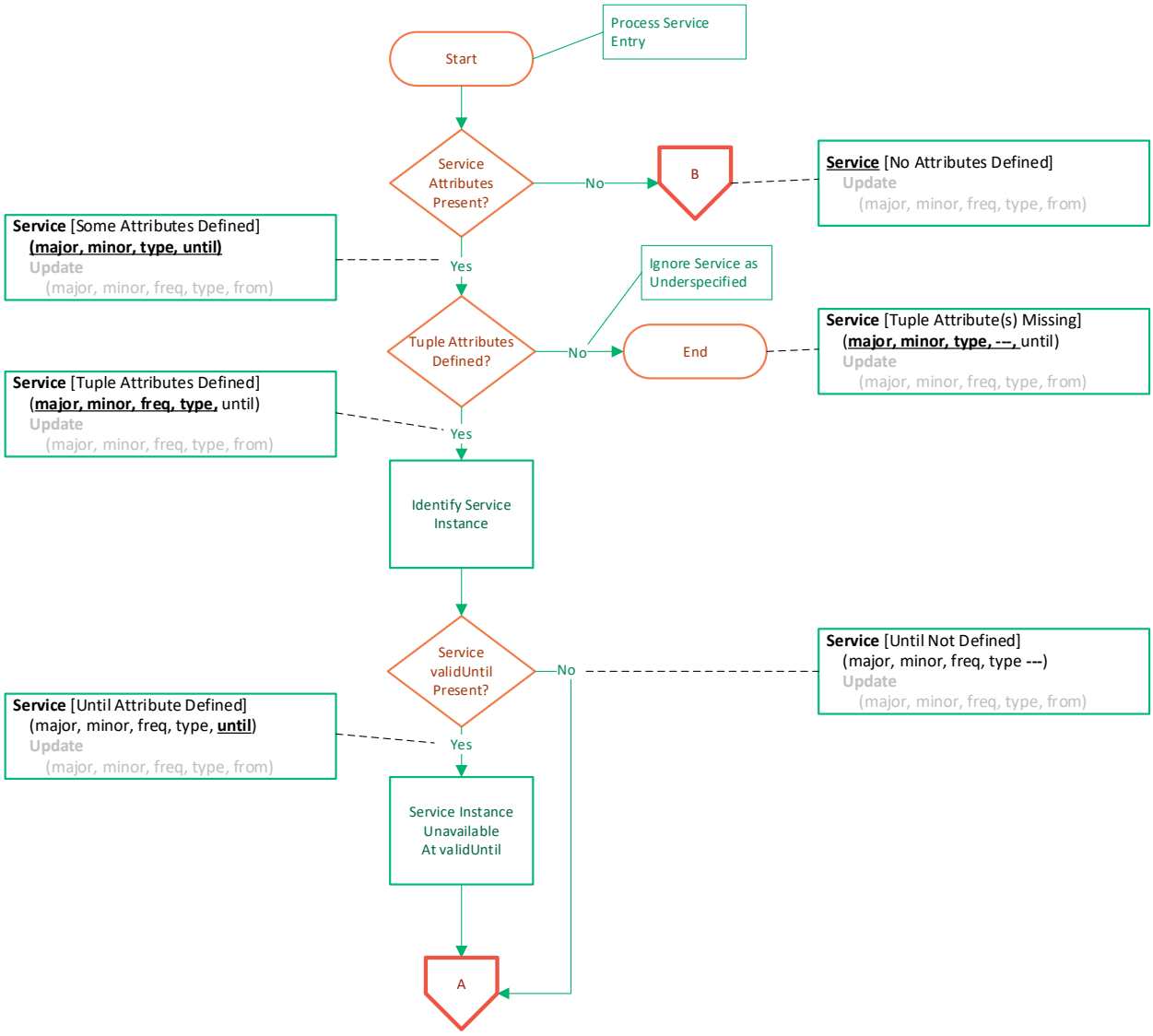


**Figure A-1** RSAT Processing Flowchart – Sheet 1.

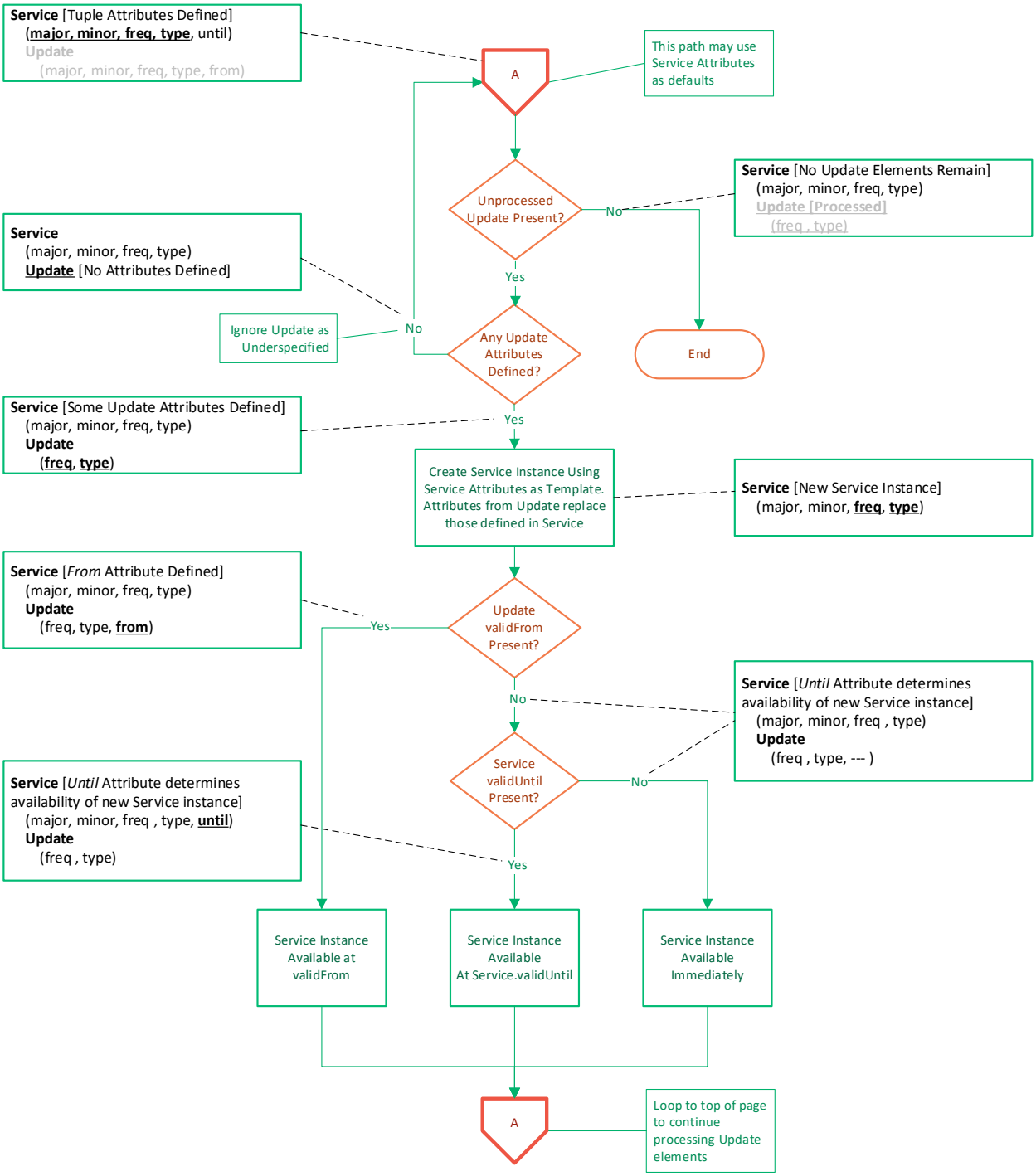


**Figure A-2** RSAT Processing Flowchart – Sheet 2.

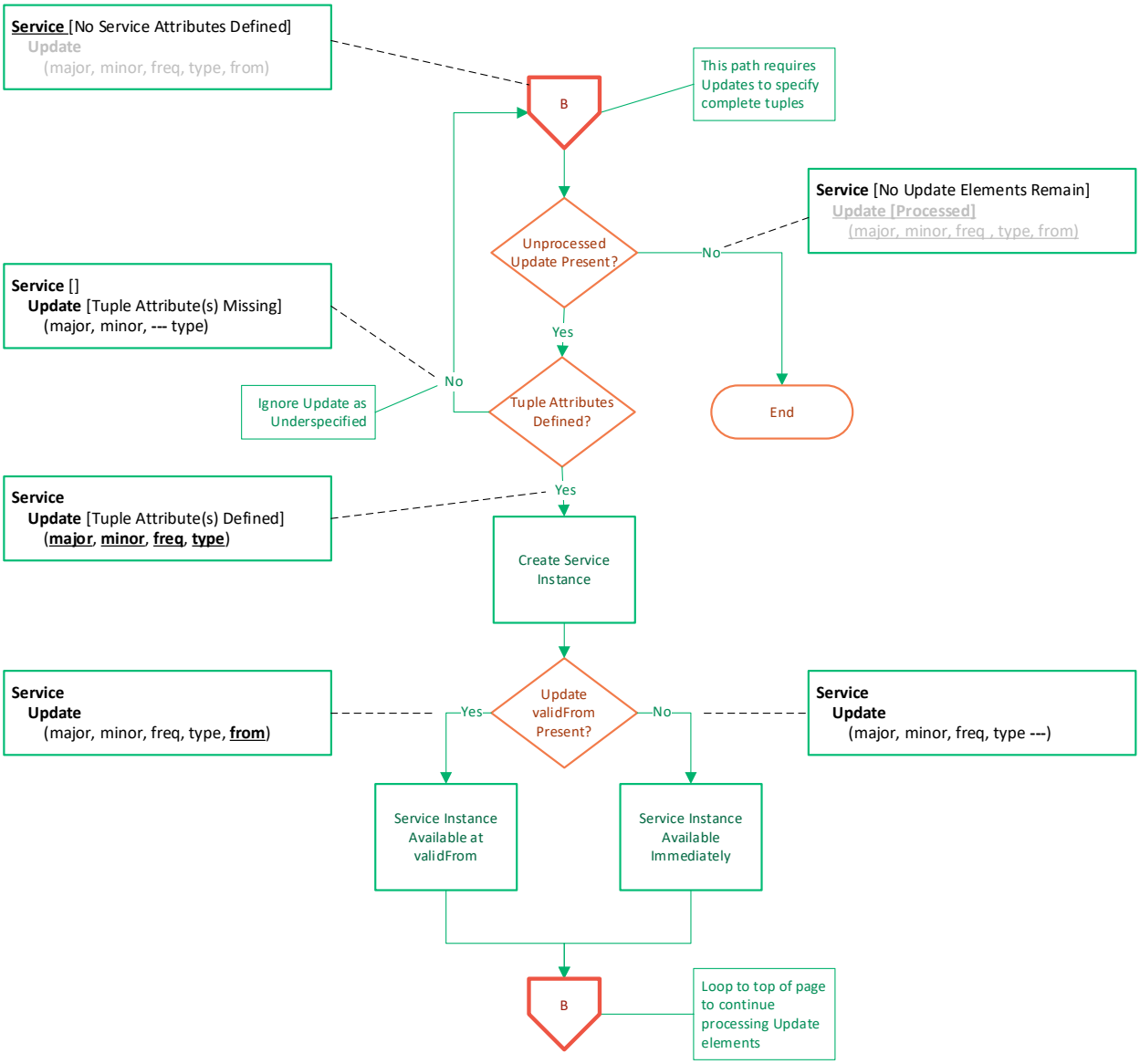


**Figure A-3** RSAT Processing Flowchart – Sheet 3.

# *Annex B*: RSAT Use Cases [Informative]

## B.1 INTRODUCTION

The following sections of this annex provide scenarios of how the RSAT data structures are intended to be used. The intent is to show how the RSAT provides information regarding the various frequency and service changes within a region.

These cases show the minimum information that could be transmitted to support each transition. More information could be sent as desired.

Note that the XML spacing is provided for clarity. The XML syntax in this annex is not definitive. The reader is directed to refer to the actual XML examples provided separately as the authoritative syntax for these examples.

### B.1.1 Use Case 1 – ATSC 1.0 (8VSB) Frequency Change

Due to repacking, a broadcaster's frequency is moving from UHF frequency 647 MHz, to UHF frequency 527 MHz. The major channel number is 23. Three services are provided and are not changing: 23.1, 23.2 and 23.3. This transition will occur on Sunday morning, July 22, 2018 at 2:00am Central Daylight Time.

The RSAT would appear as follows:

```
<RSAT>

   <!-- 23.1 Service moving to new frequency -->
   <Service     majorChannelNo = "23"
                minorChannelNo = "1"
                frequency = "647.0"
                broadcastType = "ATSC1.0"
                validUntil = ”2018-07-22T07:00:00Z" >
      <Update   frequency = "527.0" />
   </Service>

   <!-- 23.2 Service moving to new frequency -->
   <Service     majorChannelNo = "23"
                minorChannelNo = "2"
                frequency = "647.0"
                broadcastType = "ATSC1.0"
                validUntil = "2018-07-22T07:00:00Z" >
      <Update   frequency = "527.0" />
   </Service>

   <!-- 23.3 Service moving to new frequency -->
   <Service     majorChannelNo = "23"
                minorChannelNo = "3"
                frequency = "647.0"
                broadcastType = "ATSC1.0"
                validUntil = "2018-07-22T07:00:00Z" >
      <Update   frequency = "527.0" />
   </Service>
</RSAT>
```

### B.1.2 Use Case 2 – ATSC 1.0 (8VSB) Channel Sharing

Due to repacking, two ATSC 1.0 broadcasters, Broadcaster A and Broadcaster B, will be combining their services onto Broadcaster A's transmitter. Both broadcasters have agreed to drop one of their minor services to accommodate the sharing. This sharing will commence early Sunday morning, August 12, 2018 at 2:00am Central Daylight Time.

Broadcaster A's existing transmission has the following characteristics:

- Three services with major number 13: 13.1 (HD), 13.2 (SD) and 13.3 (SD)
- Frequency on AAA MHz

Broadcaster B's existing transmission has the following characteristics:

- Three services with major number 35: 35.1 (HD), 35.2 (SD) and 35.3 (SD)
- Frequency on BBB MHz

Services 13.3 and 35.3 will no longer be transmitted after the merge. Services 13.1 and 13.2 will remain unchanged.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- 13.3 Service to be removed -->
   <Service     majorChannelNo = "13"
                minorChannelNo = "3"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2018-08-12T07:00:00Z" >
   </Service>

   <!-- 35.1 Service moving to new shared frequency -->
   <Service     majorChannelNo = "35"
                minorChannelNo = "1"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-08-12T07:00:00Z" >
      <Update   frequency = "AAA" />
   </Service>

   <!-- 35.2 Service moving to new shared frequency -->
   <Service     majorChannelNo = "35"
                minorChannelNo = "2"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-08-12T07:00:00Z" >
      <Update   frequency = "AAA" />
   </Service>

   <!-- 35.3 Service to be removed -->
   <Service     majorChannelNo = "35"
                minorChannelNo = "3"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-08-12T07:00:00Z" >
   </Service>
</RSAT>
```

### B.1.3 Use Case 3 – ATSC 1.0 (8VSB) Channel Transition to ATSC 3.0

A broadcaster has decided to begin broadcasting an ATSC 3.0 signal. The ATSC 1.0 signal will remain in place for some weeks during the transition. The new transmitter will commence operation on a Friday afternoon, July 20, 2018 at 5:00pm Eastern Daylight Time. The 8VSB signal will cease broadcasting on October 28, 2018 at midnight Eastern time. The broadcaster's four services will be duplicated across both transmissions. The broadcaster's major number will remain '6'.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- 6.1 Service moving to new frequency with overlapping transmissions -->
   <Service     majorChannelNo = "6"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2018-10-28T04:00:00Z" >
      <Update   frequency = "BBB"
                broadcastType = "ATSC3.0"
                validFrom = "2018-07-20T21:00:00Z" />
   </Service>

   <!-- 6.2 Service moving to new frequency with overlapping transmissions -->
   <Service     majorChannelNo = "6"
                minorChannelNo = "2"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2018-10-28T04:00:00Z" >
      <Update   frequency = "BBB"
                broadcastType = "ATSC3.0"
                validFrom = "2018-07-20T21:00:00Z" />
   </Service>

   <!-- 6.3 Service moving to new frequency with overlapping transmissions -->
   <Service     majorChannelNo = "6"
                minorChannelNo = "3"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2018-10-28T04:00:00Z" >
      <Update   frequency = "BBB"
                broadcastType = "ATSC3.0"
                validFrom = "2018-07-20T21:00:00Z" />
   </Service>

   <!-- 6.4 Service moving to new frequency with overlapping transmissions -->
   <Service     majorChannelNo = "6"
                minorChannelNo = "4"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2018-10-28T04:00:00Z" >
      <Update   frequency = "BBB"
                broadcastType = "ATSC3.0"
                validFrom = "2018-07-20T21:00:00Z" />
   </Service>
</RSAT>
```

### B.1.4 Use Case 4 – Advent of New ATSC 3.0 Shared Transmission

For this situation, two broadcasters have agreed to launch an ATSC 3.0 lighthouse transmission carrying the primary service from each cooperating broadcaster. Their respective ATSC 1.0 signals will remain in place indefinitely while this transmitter is in operation. The new transmitter will commence operation on a Friday afternoon, September 14, 2018 at 5:00pm Eastern Daylight Time. Broadcaster A has the major channel number '6' and Broadcaster B operates with major channel number '12'. A new third ATSC 3.0 channel is also defined in this case to demonstrate the creation of a completely new service. Note that to indicate that the ATSC 3.0 version of the service is preferred, the `preferred` attribute is set on the `Update` element.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- 6.1 Service duplicated on new 3.0 frequency -->
   <Service     majorChannelNo = "6"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0" >
      <Update   preferred = "true"
                frequency = "LLL"
                broadcastType = "ATSC3.0"
                validFrom = "2018-09-14T09:00:00Z" />
   </Service>

   <!-- 12.1 Service duplicated on new 3.0 frequency -->
   <Service     majorChannelNo = "12"
                minorChannelNo = "1"
                frequency = "BBB"
                broadcastType = "ATSC1.0" >
      <Update   preferred = "true"
                frequency = "LLL"
                broadcastType = "ATSC3.0"
                validFrom = "2018-09-14T09:00:00Z" />
   </Service>

   <!-- New 29.1 Service created on new 3.0 frequency -->
   <Service>
      <Update   preferred = "true"
                majorChannelNo = "29"
                minorChannelNo = "1"
                frequency = "LLL"
                broadcastType = "ATSC3.0"
                validFrom = "2018-09-14T09:00:00Z" />
   </Service>
</RSAT>
```

### B.1.5 Use Case 5 – New Service Branding

In this use case, services are moving from one transmitter to another and are being rebranded with new major and minor channel numbers. The RSAT data structure provides a means for Services to be defined with new Service Reception Specification in which the major and minor channel numbers change. In this example, a broadcaster has two disparate transmitters on different frequencies with different branding. The broadcaster is going to move two minor services from one transmitter to another and change their minor numbers. In addition, a third minor service is going to change from one minor number to another on transmitter A and a fourth service will be

added to transmitter B. The new branding will commence operation early Sunday morning, August 5, 2018 at 2:00am Pacific Daylight Time. All services on transmitter A have the major channel number '16'. All services on transmitter B have major channel number '24'.

The RSAT for this transition would appear as follows:

```
<RSAT>
   <Service     majorChannelNo = "16"
                minorChannelNo = "2"
                frequency = "485.0"
                broadcastType = "ATSC1.0"
                validUntil = "2018-08-05T09:00:00Z" >
      <Update   majorChannelNo = "24"
                frequency = "533.0"
                broadcastType = "ATSC3.0" />
   </Service>
   <Service     majorChannelNo = "16"
                minorChannelNo = "3"
                frequency = "485.0"
                broadcastType = "ATSC1.0" >
                validUntil = "2018-08-05T09:00:00Z" >
      <Update   majorChannelNo = "24"
                frequency = "533.0"
                broadcastType = "ATSC3.0" />
   </Service>
   <Service     majorChannelNo = "16"
                minorChannelNo = "4"
                frequency = "485.0"
                broadcastType = "ATSC1.0" >
                validUntil = "2018-08-05T09:00:00Z" >
      <Update   minorChannelNo = "2" />
   </Service>
   <Service>
      <Update   majorChannelNo = "24"
                minorChannelNo = "4"
                frequency = "533.0"
                broadcastType = "ATSC3.0"
                validFrom = "2018-09-14T09:00:00Z" />
   </Service>
</RSAT>
```

### B.1.6 Use Case 6 – ATSC 3.0 Transition in Typical Mid-Sized Market

This scenario shows how the RSAT would be used to signal services availability changes in a typical mid-sized broadcast market. Initially, five broadcasters are providing services as ATSC 1.0 on five separate transmitters. As the transition proceeds, each transmitter is changed to ATSC 3.0 and services are moved around within the other transmitters to maintain the current ATSC 1.0 services as much as possible while also introducing new ATSC 3.0 services to the market. This process is described occurring over several years.

The following subsections describe how the RSAT would be constructed to communicate each phase of the transition.

#### B.1.6.1 Use Case 6 – Initial State

The RSAT can be used to communicate the current services available in a region. It is anticipated that broadcasters may make this data structure available over broadband while communicating the particular URL of that broadband location using the broadcast RSAT. In this case, the broadcast

would contain a simple RSAT data structure with only one attribute pointing at the web server containing the full RSAT.

For this example, each broadcaster would send out the following RSAT pointing back to a common server.

```
RSATInetURL
<RSAT>
   <Service
      RSATInetURL = "https://www.localTV.com/region12/all_services.rsat" >
   </Service
</RSAT>
```

The RSAT XML data structure returned by this request would be constructed as shown below. For simplicity, a letter, "A", "B", "C", "D", and "E", designates the major channel number of each broadcaster, respectively. Minor channel numbers remain as numbers identifying different services provided by the same broadcaster. Similarly, the frequency of each transmitter will be designed by three letters corresponding to the major channel number, so "A.1" denotes the primary service on frequency "AAA". Also, note that no time is provided for each service indicating that this is the current steady state.

```
<RSAT>
   <Service     majorChannelNo = "A"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "A"
                minorChannelNo = "2"
                frequency = "AAA"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "A"
                minorChannelNo = "3"
                frequency = "AAA"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "B"
                minorChannelNo = "1"
                frequency = "BBB"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "B"
                minorChannelNo = "2"
                frequency = "BBB"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "B"
                minorChannelNo = "3"
                frequency = "BBB"
                broadcastType = "ATSC1.0" >
   </Service>
   <Service     majorChannelNo = "C"
                minorChannelNo = "1"
                frequency = "CCC"
                broadcastType = "ATSC1.0" >
```

```
    </Service>
    <Service     majorChannelNo = "C"
                 minorChannelNo = "2"
                 frequency = "CCC"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "C"
                 minorChannelNo = "3"
                 frequency = "CCC"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "D"
                 minorChannelNo = "1"
                 frequency = "DDD"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "D"
                 minorChannelNo = "2"
                 frequency = "DDD"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "D"
                 minorChannelNo = "3"
                 frequency = "DDD"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "E"
                 minorChannelNo = "1"
                 frequency = "EEE"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "E"
                 minorChannelNo = "2"
                 frequency = "EEE"
                 broadcastType = "ATSC1.0" >
    </Service>
    <Service     majorChannelNo = "E"
                 minorChannelNo = "3"
                 frequency = "EEE"
                 broadcastType = "ATSC1.0" >
    </Service>
</RSAT>
```

#### B.1.6.2 Use Case 6 – Transition 1: ATSC 3.0 Transmission

For the first transition, the broadcaster providing the services on frequency "EEE" has agreed to be the initial ATSC 3.0 transmission. As part of this agreement, broadcaster E will carry the primary service of each of the other broadcasters as ATSC 3.0 HD HDR while the other broadcasters will carry the "E" services. Specifically, broadcaster A will carry "E.1" as HD requiring that A's secondary services move to broadcaster B due to bandwidth constraints. Similarly, broadcaster E's secondary services will move to broadcasters C and D.

In addition, the new ATSC 3.0 services on the ATSC 3.0 transmission will be designated as preferred. The transition is scheduled for Friday afternoon, June 15, 2018 at 5:00pm Mountain Daylight Time.

The RSAT for this transition would appear as follows:

```
<RSAT>
```

```
<!-- A.1 Service duplicated on new 3.0 frequency EEE -->
<Service     majorChannelNo = "A"
             minorChannelNo = "1"
             frequency = "AAA"
             broadcastType = "ATSC1.0" >
   <Update   preferred = "true"
             frequency = "EEE"
             broadcastType = "ATSC3.0"
             validFrom = "2018-06-15T23:00:00Z" />
</Service>

<!-- A.2 Service moving to BBB frequency -->
<Service     majorChannelNo = "A"
             minorChannelNo = "2"
             frequency = "AAA"
             broadcastType = "ATSC1.0" >
             validUntil = "2018-06-15T23:00:00Z" >
   <Update   frequency = "BBB" />
</Service>

<!-- A.3 Service moving to BBB frequency -->
<Service     majorChannelNo = "A"
             minorChannelNo = "3"
             frequency = "AAA"
             broadcastType = "ATSC1.0" >
             validUntil = "2018-06-15T23:00:00Z" >
   <Update   frequency = "BBB" />
</Service>

<!-- B.1 Service duplicated on new 3.0 frequency EEE -->
<Service     majorChannelNo = "B"
             minorChannelNo = "1"
             frequency = "BBB"
             broadcastType = "ATSC1.0" >
   <Update   preferred = "true"
             frequency = "EEE"
             broadcastType = "ATSC3.0"
             validFrom = "2018-06-15T23:00:00Z" />
</Service>

<!-- C.1 Service duplicated on new 3.0 frequency EEE -->
<Service     majorChannelNo = "C"
             minorChannelNo = "1"
             frequency = "CCC"
             broadcastType = "ATSC1.0" >
   <Update   preferred = "true"
             frequency = "EEE"
             broadcastType = "ATSC3.0"
             validFrom = "2018-06-15T23:00:00Z" />
</Service>

<!-- D.1 Service duplicated on new 3.0 frequency -->
<Service     majorChannelNo = "D"
             minorChannelNo = "1"
             frequency = "DDD"
             broadcastType = "ATSC1.0" >
   <Update   preferred = "true"
             frequency = "EEE"
```

```
                broadcastType = "ATSC3.0"
                validFrom = "2018-06-15T23:00:00Z" />
    </Service>

    <Service    majorChannelNo = "E"
                minorChannelNo = "1"
                frequency = "EEE"
                broadcastType = "ATSC1.0"
                validUntil = "2018-06-15T23:00:00Z" >

       <!-- E.1 ATSC 1.0 Service moving to frequency AAA -->
       <Update  frequency = "AAA" />

       <!-- E.1 Service on frequency EEE moving to ATSC 3.0 -->
       <Update  preferred = "true"
                broadcastType = "ATSC3.0" />
    </Service>

    <!-- E.2 Service moving to CCC frequency -->
    <Service    majorChannelNo = "E"
                minorChannelNo = "2"
                frequency = "EEE"
                broadcastType = "ATSC1.0" >
                validUntil = "2018-06-15T23:00:00Z" >
       <Update  frequency = "CCC" />
    </Service>

    <!-- E.3 Service moving to DDD frequency -->
    <Service    majorChannelNo = "E"
                minorChannelNo = "3"
                frequency = "EEE"
                broadcastType = "ATSC1.0" >
                validUntil = "2018-06-15T23:00:00Z" >
       <Update  frequency = "DDD" />
       </Service>
</RSAT>
```

### B.1.6.3 Use Case 6 – Transition 2: ATSC 3.0 Transmission + 1

For the second transition, broadcaster D is now switching to ATSC 3.0. Two of the ATSC 3.0 services previously broadcast on the first ATSC 3.0 transmission can move to the new transmitter. Since the bandwidth of the two ATSC 3.0 broadcasts is doubled, all ATSC 3.0 services can move to UHD. Unfortunately, due to ATSC 1.0 bandwidth constraints, the tertiary services offered by all broadcasters no longer can be supported and are abandoned. Note that this is simply to demonstrate the capabilities of the RSAT. In a real-world scenario, these services could be moved to ATSC 3.0 as well.

To accommodate this arrangement, the following changes are made to the services in the region:

ATSC 1.0 service "D.1" moves to frequency "BBB",

ATSC 1.0 secondary services, "A.2", "B.2" and "D.2" move to frequency "CCC", and

ATSC 1.0 services "A.3", “B.3”, "C.3", "D.3", "E.2" and "E.3" are no longer broadcast.

The transition is scheduled for early Sunday morning, November 18, 2018 at 2:00am Mountain Standard Time.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- A.2 Service moving to frequency CCC -->
   <Service     majorChannelNo = "A"
                minorChannelNo = "2"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
      <Update   frequency = "CCC" />
   </Service>

   <!-- A.3 Service no longer broadcast -->
   <Service     majorChannelNo = "A"
                minorChannelNo = "3"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>

   <!-- B.2 Service moving to frequency CCC -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "2"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
      <Update   frequency = "CCC" />
   </Service>

   <!-- B.3 Service no longer broadcast -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "3"
                frequency = "BBB"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>

   <!-- C.1 ATSC 3.0 Service moving to frequency DDD -->
   <Service     majorChannelNo = "C"
                minorChannelNo = "1"
                frequency = "EEE"
                broadcastType = "ATSC3.0"
                validUntil = "2018-11-18T09:00:00Z" >
      <Update   frequency = "DDD" />
   </Service>

   <!-- C.3 Service no longer broadcast -->
   <Service     majorChannelNo = "C"
                minorChannelNo = "3"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>

   <!-- D.1 Service moving to frequency BBB -->
   <Service     majorChannelNo = "D"
                minorChannelNo = "1"
                frequency = "DDD"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
```

```
      <Update   frequency = "BBB" />
   </Service>

   <!-- D.1 ATSC 3.0 Service moving to frequency EEE -->
   <Service     majorChannelNo = "D"
                minorChannelNo = "1"
                frequency = "EEE"
                broadcastType = "ATSC3.0"
                validUntil = "2018-11-18T09:00:00Z" >
      <Update   frequency = "DDD" />
   </Service>

   <!-- D.2 Service moving to frequency CCC -->
   <Service     majorChannelNo = "D"
                minorChannelNo = "2"
                frequency = "DDD"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
      <Update   frequency = "CCC" />
   </Service>

   <!-- D.3 Service no longer broadcast -->
   <Service     majorChannelNo = "D"
                minorChannelNo = "3"
                frequency = "DDD"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>

   <!-- E.2 Service no longer broadcast -->
   <Service     majorChannelNo = "E"
                minorChannelNo = "2"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>

   <!-- E.3 Service no longer broadcast -->
   <Service     majorChannelNo = "E"
                minorChannelNo = "3"
                frequency = "DDD"
                broadcastType = "ATSC1.0"
                validUntil = "2018-11-18T09:00:00Z" >
   </Service>
</RSAT>
```

#### B.1.6.4 Use Case 6 – Transition 3: Three ATSC 3.0 Transmitters

For the third transition, broadcaster C is now switching to ATSC 3.0. Broadcaster C's primary ATSC 3.0 service moves to its final frequency. Due to the restrictions on bandwidth in the remaining two ATSC 1.0 stations, all secondary services are moved to ATSC 3.0 with "E.2" restored.

To accommodate this arrangement, the following changes are made to the available services in the region:

ATSC 1.0 service "C.1" moves to frequency "AAA" where "A.1" and "E.1" are already present,

ATSC 3.0 service "C.1" moves 'home' to frequency "CCC",

ATSC 1.0 secondary services, "A.2", "B.2" and "C.2" remain on frequency "CCC" but transition to ATSC 3.0,

ATSC 1.0 service "D.2", moves to ATSC 3.0 on its final frequency "DDD", and

Service "E.2" is restored to frequency "DDD".

The transition is scheduled for early Sunday morning, May 19, 2019 at 2:00am Mountain Daylight Time.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- A.2 Service moving to ATSC 3.0 on frequency CCC -->
   <Service     majorChannelNo = "A"
                minorChannelNo = "2"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2019-05-19T08:00:00Z" >
      <Update   broadcastType = "ATSC3.0" />
   </Service>

   <!-- B.2 Service moving to ATSC 3.0 on frequency CCC -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "2"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2019-05-19T08:00:00Z" >
      <Update   broadcastType = "ATSC3.0" />
   </Service>

   <!-- C.1 Service moving to frequency AAA -->
   <Service     majorChannelNo = "C"
                minorChannelNo = "1"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2019-05-19T08:00:00Z" >
      <Update   frequency = "AAA" />
   </Service>

   <!-- C.1 ATSC 3.0 Service moving to frequency CCC -->
   <Service     preferred = “true”
                majorChannelNo = "C"
                minorChannelNo = "1"
                frequency = "DDD"
                broadcastType = "ATSC3.0"
                validUntil = "2019-05-19T08:00:00Z" >
      <Update   frequency = "CCC" />
   </Service>

   <!-- C.2 Service moving to ATSC 3.0 on frequency CCC -->
   <Service     majorChannelNo = "C"
                minorChannelNo = "2"
                frequency = "CCC"
                broadcastType = "ATSC1.0"
                validUntil = "2019-05-19T08:00:00Z" >
      <Update   broadcastType = "ATSC3.0" />
   </Service>
```

```
    <!-- D.2 Service moving to ATSC 3.0 on frequency DDD -->
    <Service     majorChannelNo = "D"
                 minorChannelNo = "2"
                 frequency = "CCC"
                 broadcastType = "ATSC1.0"
                 validUntil = "2019-05-19T08:00:00Z" >
       <Update   frequency = “DDD”
                 broadcastType = "ATSC3.0" />
    </Service>

    <!-- E.2 Service restored to ATSC 3.0 on frequency DDD -->
    <Service
       <Update   majorChannelNo = "E"
                 minorChannelNo = "2"
                 frequency = "DDD"
                 broadcastType = "ATSC3.0"
                 validFrom = "2019-05-19T08:00:00Z" />
    </Service>
</RSAT>
```

### B.1.6.5 Use Case 6 – Transition 4: ATSC 1.0 Nightlight and Four ATSC 3.0 Transmitters

For the fourth transition, broadcaster B is now switching to ATSC 3.0 leaving only broadcaster A’s frequency to carry ATSC 1.0 transmissions as a so-called ‘Nightlight’. To allow all the ATSC 1.0 primary services to fit in a single broadcast, they are reduced to 16 × 9 SD format. Broadcaster B’s services now move to the BBB frequency where they will ultimately reside. Additional tertiary services are also restored to B and D transmissions which are now ATSC 3.0.

To accommodate this arrangement, the following changes are made to the available services in the region:

ATSC 1.0 services "B.1" and "D.1" move to frequency "AAA" where "A.1", “C.1” and "E.1" are already present,

ATSC 3.0 service "B.1" moves ‘home’ to frequency "BBB" along with "B.2" service moving from frequency "CCC" and service "B.3" being restored,

A new ATSC 3.0 service "D.3" is restored to frequency "DDD", and

ATSC 3.0 service "E.2" is restored on frequency "EEE".

The transition is scheduled for early Sunday morning, November 10, 2019 at 2:00am Mountain Standard Time.

The RSAT for this transition would appear as follows:

```
<RSAT>

    <!-- B.1 ATSC 1.0 Service moving to frequency AAA -->
    <Service     majorChannelNo = "B"
                 minorChannelNo = "1"
                 frequency = "BBB"
                 broadcastType = "ATSC1.0"
                 validUntil = "2019-11-10T09:00:00Z" >
       <Update   frequency = "AAA" />
    </Service>

    <!-- D.1 ATSC 1.0 Service moving to frequency AAA -->
    <Service     majorChannelNo = "D"
                 minorChannelNo = "1"
                 frequency = "BBB"
                 broadcastType = "ATSC1.0"
```

```
                validUntil = "2019-11-10T09:00:00Z" >
      <Update   frequency = "AAA" />
   </Service>

   <!-- B.1 ATSC 3.0 Service moving to frequency BBB -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "1"
                frequency = "EEE"
                broadcastType = "ATSC3.0"
                validUntil = "2019-11-10T09:00:00Z" >
      <Update   frequency = "BBB" />
   </Service>

   <!-- B.2 ATSC 3.0 Service moving to frequency BBB -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "2"
                frequency = "CCC"
                broadcastType = "ATSC3.0"
                validUntil = "2019-11-10T09:00:00Z" >
      <Update   frequency = "BBB" />
   </Service>

   <!-- B.3 Service restored to frequency BBB -->
   <Service>
      <Update   majorChannelNo = "B"
                minorChannelNo = "3"
                frequency = "BBB"
                broadcastType = "ATSC3.0"
                validFrom = "2019-11-10T09:00:00Z" />
   </Service>

   <!-- D.3 Service restored to frequency DDD -->
   <Service>
      <Update   majorChannelNo = "D"
                minorChannelNo = "3"
                frequency = "DDD"
                broadcastType = "ATSC3.0"
                validFrom = "2019-11-10T09:00:00Z" />
   </Service>

   <!-- E.2 Service restored to frequency EEE -->
   <Service>
      <Update   majorChannelNo = "E"
                minorChannelNo = "2"
                frequency = "EEE"
                broadcastType = "ATSC3.0"
                validFrom = "2019-11-10T09:00:00Z" />
   </Service>
</RSAT>
```

#### B.1.6.6 Use Case 6 – Transition 5: ATSC 3.0 Transition Complete

For the final transition, broadcaster A is now switching to ATSC 3.0. Broadcaster A's services now move to their 'home' frequency and with the tertiary service restored. Additional tertiary services are also restored to C and E transmissions which are now ATSC 3.0.

To accommodate this arrangement, the following changes are made to the available services in the region:

ATSC 1.0 services "A.1", "B.1", "C.1", "D.1", and "E.1" are no longer being broadcast,

ATSC 3.0 service "A.1" moves ‘home’ to frequency "AAA" along with "A.2" service moving from frequency "CCC" and service "A.3" being restored,

A new ATSC 3.0 service "C.3" is restored to frequency "CCC", and

ATSC 3.0 service "E.3" is restored on frequency "EEE".

The transition is scheduled for early Sunday morning, June 14, 2020 at 2:00am Mountain Daylight Time.

The RSAT for this transition would appear as follows:

```
<RSAT>

   <!-- A.1 ATSC 1.0 Service no longer available -->
   <Service     majorChannelNo = "A"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2020-06-14T08:00:00Z" >
   </Service>

   <!-- B.1 ATSC 1.0 Service no longer available -->
   <Service     majorChannelNo = "B"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2020-06-14T08:00:00Z" >
   </Service>

   <!-- C.1 ATSC 1.0 Service no longer available -->
   <Service     majorChannelNo = "C"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2020-06-14T08:00:00Z" >
   </Service>

   <!-- D.1 ATSC 1.0 Service no longer available -->
   <Service     majorChannelNo = "D"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2020-06-14T08:00:00Z" >
   </Service>

   <!-- E.1 ATSC 1.0 Service no longer available -->
   <Service     majorChannelNo = "E"
                minorChannelNo = "1"
                frequency = "AAA"
                broadcastType = "ATSC1.0"
                validUntil = "2020-06-14T08:00:00Z" >
   </Service>

   <!-- A.1 ATSC 3.0 Service moving to frequency AAA -->
   <Service     majorChannelNo = "A"
                minorChannelNo = "1"
                frequency = "EEE"
                broadcastType = "ATSC3.0"
                validUntil = "2020-06-14T08:00:00Z" >
```

```
        <Update   frequency = "AAA" />
    </Service>

    <!-- A.2 ATSC 3.0 Service moving to frequency AAA -->
    <Service     majorChannelNo = "A"
                 minorChannelNo = "2"
                 frequency = "CCC"
                 broadcastType = "ATSC3.0"
                 validUntil = "2020-06-14T08:00:00Z" >
        <Update   frequency = "AAA" />
    </Service>

    <!-- C.3 Service restored to frequency CCC -->
    <Service>
        <Update   majorChannelNo = "C"
                  minorChannelNo = "3"
                  frequency = "CCC"
                  broadcastType = "ATSC3.0"
                  validFrom = "2019-11-10T08:00:00Z" />
    </Service>

    <!-- E.3 Service restored to frequency EEE -->
    <Service>
        <Update   majorChannelNo = "E"
                  minorChannelNo = "3"
                  frequency = "EEE"
                  broadcastType = "ATSC3.0"
                  validFrom = "2019-11-10T08:00:00Z" />
    </Service>
</RSAT>
```

# ***Annex C***: Media Type Registration

This Annex documents new media types registered by IANA at:
https://www.iana.org/assignments/media-types/media-types.xhtml#application.

*Notice to editors*: any changes to this Annex are subject to review by IETF and IANA as described in IETF BCP 13 [9].

## C.1 RSAT

Type name:
application
Subtype name:
atsc-rsat+xml
Required parameters:
None.
Optional parameters:
charset
If specified, the charset parameter must match the XML encoding declaration, or if absent, the encoding is determined from the XML document itself. See also "Encoding considerations" below.
Encoding considerations:
Same as for application/xml, except constrained to UTF-8. See IETF 7303, Section 9.1. For the purpose of filling out the IANA Application for Media Type, the value, "binary", applies.
Security considerations:
This media type inherits the issues common to all XML media types – see RFC 7303 [10] Section 10. This media format is used to describe broadcast and broadband services. This format is highly susceptible to manipulation or spoofing for attacks desiring to mislead a receiver about a session. Both integrity protection and source authentication are recommended to prevent misleading of processors. This type does not employ executable content, but since it is explicitly extensible then executable content could appear in an extension. This media type does not provide any confidentiality protection and instead relies on the transport protocol that carries it to provide such security, if needed.
Interoperability considerations:
The published specification describes processing semantics that dictate behavior that must be followed when dealing with, among other things, unrecognized elements and attributes, both in the document's namespace and in other namespaces.
Because this is extensible, conformant processors may expect (and enforce) that content received is well-formed XML, but it cannot be guaranteed that the content is valid to a particular DTD or Schema or that the processor will recognize all of the elements and attributes in the document.

Published specification:

This media type registration is an integral part of ATSC A/200, "Regional Service Availability", Annex C. The payload is defined in Section 5.1. This specification and XML schema for the content are available at www.atsc.org/standards (the schema(s) are provided in a zip file).

Applications that use this media type:

ATSC 3.0 television and Internet encoders, decoders and other facility and consumer equipment.

Additional information:

File extension(s):

.rsat

Macintosh file type code(s):

"RSAT"

Person & email address to contact for further information:

Editor, Advanced Television Systems Committee (jwhitaker@atsc.org)

Intended usage:

COMMON

Restrictions on usage:

None

Author:

ATSC.

Change controller:

ATSC.

– End of Document –